Sensors and Actuators
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Lecture - 10
Cleanroom Protocols

In the non-conventional cleanroom is the cleanroom where you do not have the filters on to a false ceiling, but instead of having you will have the filters that you will be looking at in the lab which are a module.

before one enters the cleanroom, there is procedure that to follows. pick up the shoe covers from the container there and stand over the carpeted area just to avoid contaminate from the external ground. After wearing the shoe covers, use the cleanroom. see the laboratory safety protocols which clearly state the mandatory protocols which are to be followed even before entering the cleanroom. Take access and enters the cleanroom.

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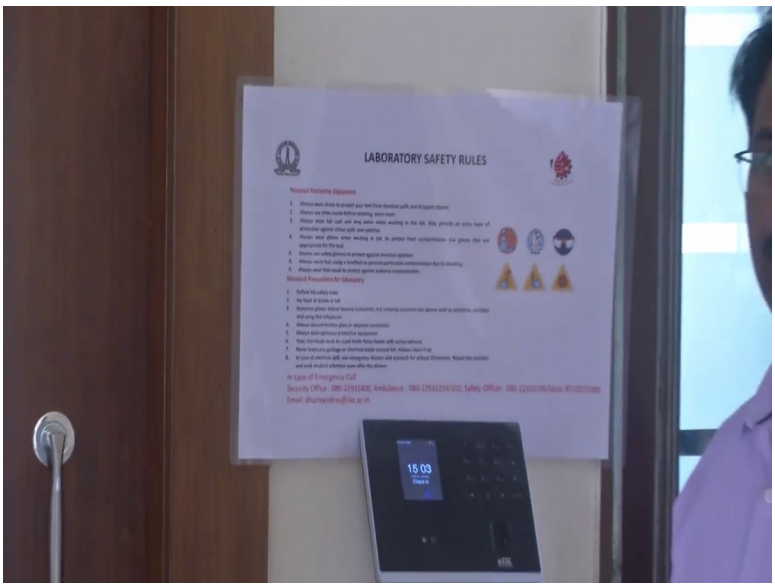

So, now once he is get got access as you can see, he opens the cleanroom door. So, now, you see how we enter the cleanroom and then shut the door. So, the noise what you saw in the cleanroom is the air filter; on top, we have an air curtain which is going to flow air

at around 10 meter per second speed. So, the influx of air is just to ensure that the particulate count is constrained or restricted to that area.

In order to reduce any sort of contamination or particulate count or dust entering inside the cleanroom, we have this mechanism of flowing high-speed air just at the entrance of the door. Now as soon as you give your fingerprint and open the door the sensor that there detects the entrance and then the air curtain gets active activated.

Now, that we have seen how our visiting scholar has used the gown there and he has worn. As you can see, he is having his shoe covers and the gown and to his right side, there is a hand sanitizer.

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there could be some sort of dust or particulates on your hand, you ensure you use this sanitizer and clean hands just so that it does not hamper the working of the device. Also, even before leaving this laboratory, always use the sanitizer.

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Next, he proceeds towards the bench where we have the hair net, face mask, and gloves. he picks up the face mask always ensuring that the white color thin strip comes on top and so, that it fixes right above right on top of your nose in a proper manner.

So, now, that we have the hair net on, let us see how the gloves are chosen and worn. So, there are three sets of gloves considering he would just do the normal works in an under workstation like just study or characterize his devices, then he would go with nitrile gloves of a particular size that fit fits him right. Gloves should always be in size with your hand. And always and it is important for you to notice while you see the video how he is using the gloves and then ensuring that the gloves sit exactly on top of the cuff sleeves of his lab coat.

In case you are moving to wet bench or any other workstation which are where you are dealing with a higher hf or such harmful acids, then what to do is you do not remove these gloves; but just on top of these gloves wear the silicon gloves or the Mapa gloves, the thick gloves which are chemical resistant. So, these gloves are not chemical resistant they are just used to protect the environment from contamination.

This is a class 10000 cleanroom and apart from the particulate count, another important heart of the cleanroom is the HEPA filter.

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the big tower here; there are four such towers in the laboratory here. This is the HEPA filter; HEPA stands for High Efficient Particulate Air, H E P A. So, they are different types of filters the EPA, UCLA HEPA filters again based on the efficiency and again depending on the type of environment and the usage.

here we have HEPA filters. The main purpose of using this is to reduce the particulate count a controlled environment inside the cleanroom is maintained just because of these filters here. it is going to maintain the temperature, the humidity levels as well as the particulate contamination and then there is a positive pressure module along with the 4 towers here. we have 2 towers here and the remaining 2 in the biology section on this side of our lab. this is the biology section and as you can see there is a tower on the other end of the biology section.

there are for such towers here and then there is a positive pressure module on one end. the positive pressure module does is, it is going to pump in pressure, this entire room is slightly at a higher pressure compared to the outside just when you go beyond the door the pressure outside is completely different, it is lower compared to this pressure here.

So, we maintain this pressure using these HEPA filters and the purpose of having higher pressure inside these rooms is just to avoid the influx of air. always know that if air always flows from a higher concentrated area to a lower pressure area. So, maintain high pressure. So, there is clean air that would go out, but then the contaminated air or the

unfiltered air which is outside would not infiltrate into this environment and that is why we call this as a controlled environment and that and hence we have the HVAC system.

So, when you are talking about recirculation, what happens is assume I am going to maintain this cleanroom at perfectly clean levels. So, the amount of energy that the entire HVAC system takes the load on the system reduces provided you put your efforts in maintaining the cleanroom you by following these procedures, reducing the particulate count.

So, by doing following these procedures, you could reduce the load on the HVAC system. Otherwise what happens is provided you want the particle account to below; however, you do not follow any of these guidelines, the amount of load that the system takes is higher. So, they have a lifetime and each of the systems has their own lifetime and efficiency frequently has to be checked. They have to be checked annually for their pressure levels. So, there is no point in them if they do not function properly and if the room is not maintained at positive pressure, then there is no point in us having a controlled environment system that there could be possibility of having you know the malfunctioning of your devices or having not maintaining the class the cleanroom for its purpose.